

20. Observations on the Land Crab, *Cardisoma armatum*,  
with especial regard to the Sense Organs. By Miss L.  
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As little has been written on the habits of this group of Crustaceans, the following observations on nine specimens from the River Gambia, although made under the artificial conditions of the Caird House for Insects, appeared worth recording.

*Sight.*—The eyes on their pedicels only partly fill the large sockets. They function ineffectually in daylight, when the crab appears to rely for guidance solely on the setæ with which the whole body is amply provided ; but in twilight the crab is able to focus on a point with tolerable accuracy.

The third pair of maxillipeds are lined at the apex with very soft hairs which are kept moistened ; this organ is supposed to cleanse the eyes from particles of grit etc., but is also used directly they are exposed to a strong light. Miss Rathbun \* mentions, in reference to this species, that direct exposure to the sun is fatal to them. This, of course, refers to the tropical sun of West Africa. When taken out into the sunlight from the subdued light of the Caird House in July the crabs used their maxillipeds with great energy during the first quarter of an hour, they then submerged in a tank of water—doubtless to moisten the respiratory surface of the branchial cavity—and afterwards seemed indifferent to the light, although exposed to it for more than an hour. Nor could they be induced to use their maxillipeds again on that occasion, even when the eyes were purposely sprinkled with water and with dust.

An experiment with flashlight was carried out in the Caird House. The crab which was exposed to the sudden strong light was sitting in the water in front of the bay, but left the tank with unusual speed and precipitated himself to the far end of the bay, where he assiduously brushed his eyes with both maxillipeds at once for several minutes. Later he was brought back for a repetition of the same experiment ; he submerged at once in the tank, and remained below water with only the eyes showing until the flash, when he scrambled out and repeated the former manoeuvres precisely. The sudden transition from a dim to a very strong light appeared to occasion him real distress ; but the switching on of the electric lights in the bay after dark, though it will arrest the crabs' movements temporarily, does not necessitate the use of the maxillipeds.

\* Bull. Amer. Mus. Nat. Hist. xliii. 1921, p. 459.

*Sense of Hearing.*—No sign of response to any sound could be obtained. During the experiment with flashlight mentioned above, it seemed unlikely that the report of the concussion was noticed; it was the light alone which had a disturbing effect, because two of the crabs were at an equal distance from the light as that specimen which was being experimented upon, but the former were shaded from the glare by a piece of cork-bark. The two which were exposed to the sound but not to the light were carefully observed during the reports but made no movement.

*Sense of Taste and Smell.*—The seat of this sense must be inside the mouth, possibly on the mandibular palp; stones, morsels of brick, and upon one occasion seaweed, were taken into the mouth, and it was fully two minutes before they were rejected as inedible. The former could be heard distinctly to grate against the mandibles. The antennules are not used in connexion with food; they are principally used when the crab is under water, and may test the salinity of the water.

*Sense of Touch.*—Setæ are scattered over the limbs, and as the crab moves sideways some of these are continually in contact with the ground and reveal the nature of the surface and the presence of food. Although the crab is undisturbed by any vibration of the air, there is immediate reaction to a vibration of the ground. If a smart tap be given to the wooden partition of the bay when the crabs have their backs against it, they will respond to each tap by swinging the eyes into the sockets; or will move away as though alarmed. The tufts of setæ at the base of the claw of the first pair of walking legs are in constant requisition while the crabs are feeding, to touch the food before it is conveyed to the mouth.

#### *Further Observations on the Habits.*

*Food.*—Dead leaves and twigs form the main food of this species in captivity. They also eat fresh fish and mice. They refused stale meat, but one night a mouse which had broken into the bay was caught by a crab, and by morning was half devoured. They were then supplied regularly with dead mice, and averaged about one in every three days. After nearly eight weeks they refused this diet and returned to vegetarianism, broken by an occasional meal of fresh fish or an occasional mouse; but they prefer all flesh food very fresh. It was during this surfeit of mice that their attitude of toleration towards one another was renounced for combativeness, and five specimens died of injuries caused by entire limbs being severed from the body. With the change of diet this pugnacious mood subsided, and the chief aggressor now lives peaceably with two smaller specimens.

*Method of Catching and Eating Mice.*—The actual capture of a live mouse has not been witnessed. When two live mice were put into the bay one evening they showed a contemptuous

disregard for the crabs. But though their agility afforded them an easy escape when a lunge was made in their direction, they ran over and under the crabs with a recklessness which brought them constantly into position to be seized by the claws, and this is doubtless how their capture is effected.

When devouring a mouse the crab begins with a leg or the tail, touching it with the setæ already alluded to and putting it into position with the small claw. The whole mouse is gradually drawn into the mouth and no part of it afterwards ejected.

*Water.*—Fresh water for immersion was preferred to artificial sea-water, even when this was diluted until only slightly brackish. A tank of natural sea-water was provided, and they bathed in this with evident pleasure, but by the next day they showed a preference for fresh water. When a week later a tank of sea-water was again introduced they treated it with indifference